SAMSUNG

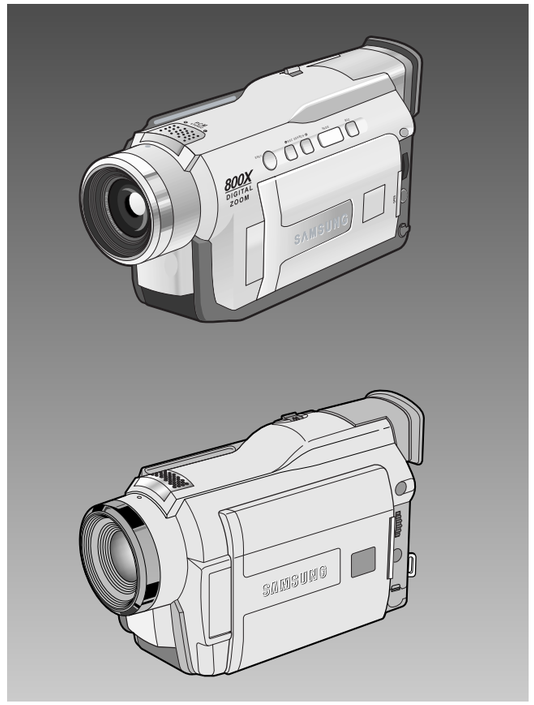
DIGITAL VIDEO CAMCORDER

Chassis : Delta
SCD20/SCD21/SCD22/SCD23/SCD24
SCD27/SCD29
VP-D20/D21/D23/D24/D26
VP-D20i/D21i/D23i/D24i/D26i

ADJUST Manual

◆ This Manual is for only Alignment and Adjustment method of “Delta” Chassis.
◆ File with the Service Manual.

DIGITAL VIDEO CAMCORDER



CONTENTS

1. VCR Adjustment
2. Camera Adjustment
3. LCD Adjustment
4. Deck Adjustment

SAMSUNG
ELECTRONICS

This Service Manual is a property of Samsung Electronics Co .,Ltd.
Any unauthorized use of Manual can be punished under applicable
International and/or domestic law.

© Samsung Electronics Co., Ltd. **JUL. 2003**
Printed in Korea
AD82-00013A

1. VCR Adjustment

1-1 VCR Adjustment Preparation

1) How to get into the VCR adjust mode

STEP 1

❶ Connect the power source.
❷ Set the power switch to “TAPE” position.

STEP 2

❶ Press and hold the "STOP" and "EASY" buttons on the video camera at the same time for more than 5 seconds.
❷ When monitor OSD appears as shown Fig. 1-2, the adjustment mode has been activated successfully.
❸ Move the “MENU Dial” to highlight VCR ADJ and push the “ENTER”. (See Fig. 1-3)
❹ When changing the adjustment item, please press the “EASY” and “DISPLAY” buttons on the video camera.
❺ You can change the adjustment value to move the “MENU Dial” Up or Down.
❻ After setting adjustment value, please push the “ENTER” to confirm Data.

STEP 3

If you want to finish the adjustment mode, you have to do Power Reset.
The Power Reset means that you pull out the power source and pull in it again.

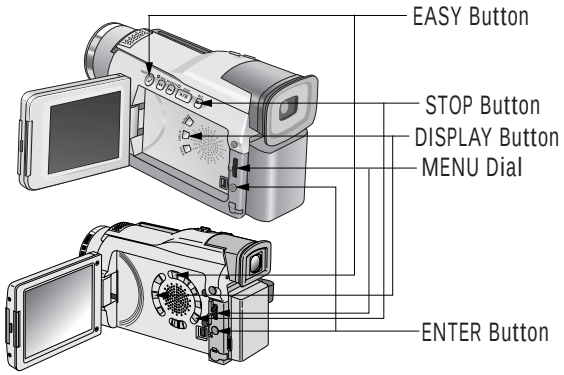


Fig. 1-1

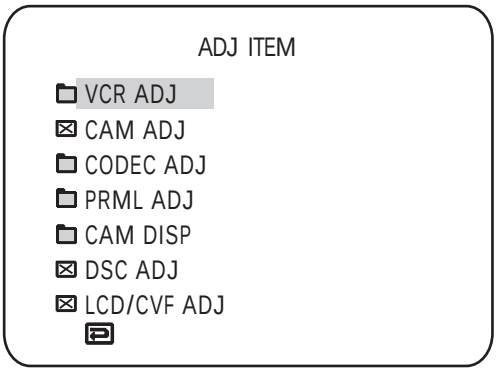


Fig. 1-2

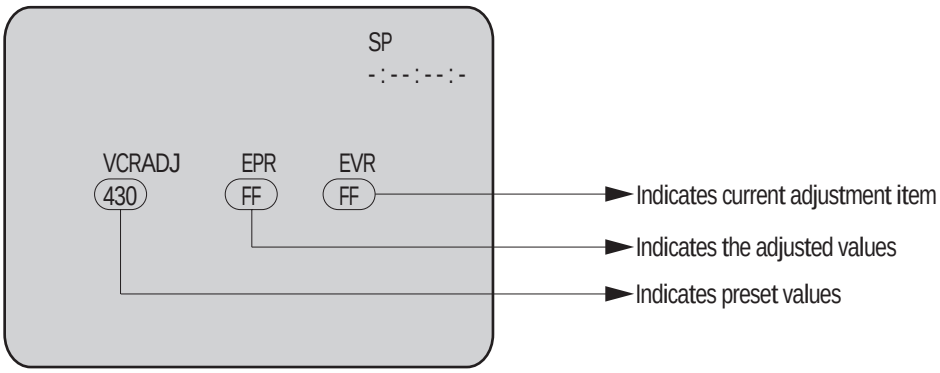


Fig. 1-3

2) Function of each buttons on the SET Key

<Table 1-1>

Buttons	Description
ENTER push (Confirm)	Stores changed value in the adjustment and auto adjustment mode.
MENU Dial down (Data Down)	Changes data in the adjustment state.
MENU Dial up (Data Up)	
EASY (Mode Up)	Changes mode.
DISPLAY (Mode Down)	

1-2 VCR Adjustment

<Table 1-2>

Model(Address)	Name	Value	Description
437	SWP Position	80	Head Switching Position Adjust

1) How to adjust Head Switching Position

❶ Get into VCR ADJUST mode.
❷ Move to the VCR ADJUST address “437”.
❸ Play standard tape, and “Head Switching Position” will be adjusted automatically.

2. Camera Adjustment

Note : How to adjust the camera system.

1) EEPROM stores confirmed adjustment value of each adjustment step.

2) DSP (Digital Signal Process : ICA01-Camera Main PCB) digitalizes the camera signal.

3) When changing IC705-Main PCB of EEPROM, readjust Main PCB.
While changing LCD PCB and CVF PCB- always readjust each part.
Since EEPROM stores confirmed adjustment value of each adjustment step, readjusting must be performed in order to store the changed data.

4) Adjust the following items after changing LENS Ass'y.

❶ Lens Zoom Track
❷ Auto HALL
❸ Auto IRIS

5) Adjust the following items after changing EEPROM and Main PCB.

❶ Lens Zoom Track
❷ Zoom VR Center
❸ Auto HALL
❹ Auto IRIS
❺ Auto White Balance (indoor)
❻ Auto White Balance (outdoor)

2-1 Adjustment Preparation

1) Measuring Instrument

❶ DC power supply
❷ Oscilloscope
❸ NTSC Vectorscope, PAL vectorscope
❹ NTSC wave form monitor, PAL wave form monitor
❺ NTSC TV or Monitor, PAL TV or Monitor
❻ Color bar chart
Gray scale chart

2) Camera PCB configuration

❶ Main PCB
❷ CCD PCB
❸ LCD PCB
❹ CVF PCB

3) Before you start

❶ Use the buttons on the SET key when adjusting camera.
❷ Press the push the "ENTER" when storing confirmed adjustment value of each adjustment step in EEPROM.
❸ The OSD shows "OK" after finishing each adjustment step.
❹ To clear the adjustment mode, pull out the power source.

4) Function of each buttons on the SET Key

<Table 2-1>

Buttons	Description
ENTER push (Confirm)	Stores changed value in the adjustment and auto adjustment mode.
MENU Dial down (Data Down)	Changes data in the adjustment state.
MENU Dial up (Data Up)	
EASY (Mode Up)	Changes mode.
DISPLAY (Mode Down)	

5) How to set up the camera adjustment mode

STEP 1

❶ Connect the power source (battery/DC cable).
❷ Set the power switch to "CAMERA" position.
❸ The OSD appears.

STEP 2

❶ Press and hold the "STOP" and "EASY" buttons on the video camera at the same time for more than 5 seconds.
❷ When monitor OSD appears as shown Fig. 2-2, the adjustment mode has been activated successfully.
❸ Move the “MENU Dial” to highlight CAM ADJ and push the “ENTERl”.
❹ When changing the adjustment item, please press the “EASY” button on the Camera.
❺ You can change the adjustment value to move the “MENU Dial” Up or Down.
❻ After setting adjustment value, please push the “ENTER” to confirm Data.

STEP 3

Monitor OSD shows " CAMERA EPR EVR / OCD FF FF ".
Then camera adjustment mode has been activated successfully.

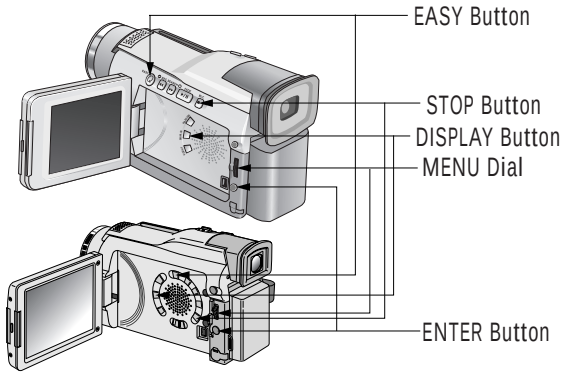


Fig. 2-1

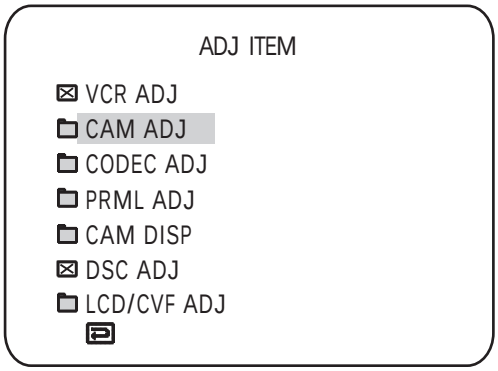


Fig. 2-2

2-2 Camera Adjustment

Note : "XX XX" indicate the previous preset value and adjusted value.
Press the “ENTER” (Confirm) to store the adjusted value.

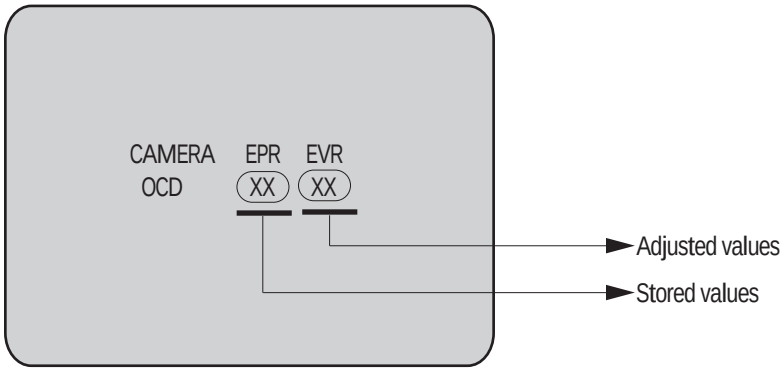


Fig. 2-3

1) EEPROM Data Initialize

Caution : This adjustment must do following items changing new EEPROM (IC705) or Main PCB.

❶ Press the “EASY”(Mode Up)/”DISPLAY”(Mode Down) buttons so that OSD shows “ODF XX XX”.
❷ Using “MENU Dial”(Data Up/Down) so that display data of EVR is “A0”
❸ Press the “ENTER” (Confirm).
❹ The OSD shows “OK” after huithing the initalize.

2) Lens Zoom Track

Caution : For whole zoom range, it shall be in focus.
The location of a focus lens is moving depending on the location of Zoom Lens.
During adjusting, micom measures the focus location from a near distance to a long.

❶ Camera is set to E-E mode.
❷ Focus chart photo.
❸ Ensure that camera is left an about 3m distance from a focus chart and the focus of lens is placed vertically.
Attach a focus chart to white or gray wall of a flat surface.
❹ Connect a video output terminal to a TV.
❺ Press the “EASY”(Mode Up)/”DISPLAY”(Mode Down) buttons so that OSD shows "ODE XX XX".
❻ Press the “ENTER” (Confirm).
Never impact on the lens when adjusting zoom and focus Lens.
The OSD shows “OK” after finishing the adjustment.

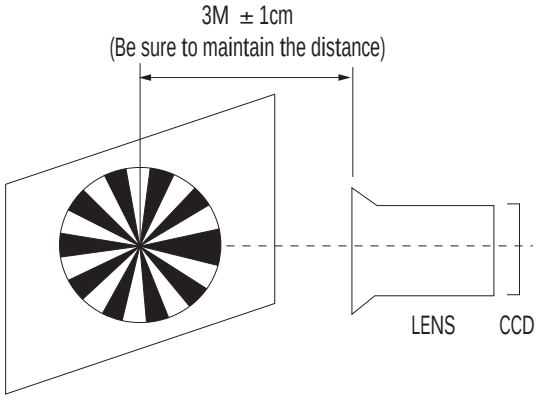


Fig. 2-4

3) Zoom VR Center

❶ Connect a video output terminal to a TV.
❷ Press the “EASY”(Mode Up)/”DISPLAY”(Mode Down) buttons so that OSD shows “OD6 XX XX”.
❸ Press the “ENTER” (Confirm).
❹ Then Micom finds out Zoom VR center position.
Store Zoom VR center value in OB7.

4) Auto HALL

❶ Connect a video output terminal to a TV.
❷ Press the “EASY”(Mode Up)/”DISPLAY”(Mode Down) buttons so that OSD shows "OCD XX XX".
❸ Press the “ENTER” (Confirm).
❹ Then micom finds out max. Hall value with an iris opened and min. Hall value with an iris closed.
Store max. and min. value of Hall in OAD and OAC respectively.
❺ The OSD shows “OK” after finishing the adjustment.

5) Auto IRIS Level

❶ Connect a video output terminal to a wave form monitor and a TV.
❷ Press the “EASY”(Mode Up)/”DISPLAY”(Mode Down) buttons so that OSD shows "OCE XX XX".
❸ Press the “ENTER” (Confirm).
❹ Then micom finds out max. Hall value with an iris opened and min.
Hall value with an iris closed. Store max. and min. value of in OBC, OBD and OBB respectively.
❺ The OSD shows “OK” after finishing the adjustment.

6) Auto White Balance (indoor)

❶ Camera mode & 3100˚ K/5100˚ K gray scale chart.
❷ Connect a video output terminal to a vectorscope and a TV.
❸ Press the “EASY”(Mode Up)/”DISPLAY”(Mode Down) buttons so that OSD shows "OD4 XX XX".
❹ Ensure that camera picks up image 40μs on 3100˚K gray scale chart precisely and the illumination is 1500~2000 Lux.
❺ Press the “ENTER” (Confirm) to ensure that white spot on a vectorscope is moving in the middle of screen.
❻ The OSD shows “OK” after finishing the adjustment.

7) Auto White Balance (outdoor)

❶ Camera mode & 3100˚ K/5100˚ K gray scale chart.
❷ Connect a video output terminal to a vectorscope and a TV.
❸ Press the “EASY”(Mode Up)/”DISPLAY”(Mode Down) buttons so that OSD shows "OD5 XX XX".
❹ Ensure that camera picks up image 40 μs on 5100 gray scale chart (3100 gray scale chart + C16 filter) precisely and the illumination is 1500~2000 Lux.
❺ Press the “ENTER” (Confirm) to ensure that white spot on a vectorscope is moving in the middle of screen.
❻ The OSD shows “OK” after finishing the adjustment.

3. LCD Adjustment

Note : For LCD adjustment, use the buttons on the video camera and the SET key.
After each adjustment step is completed, OSD shows "OK".
EEPROM(ICL202) stores confirmed adjustment value of each adjustment step.
After finishing the adjustment, turn power off.

3-1 How to get into the LCD adjust mode

STEP 1

❶ Connect the power source (battery/DC cable).
❷ Set the power switch to "REC" position.
❸ Set the Lens to CAMCORDER.
❹ Camera screen and OSD appears.
❺ Open housing of the video camera and remove tape.
❻ Open the LCD.

STEP 2

❶ Press and hold the "STOP" and "EASY" buttons on the video camera at the same time for more than 5 seconds.
❷ When monitor OSD appears as shown Fig. 3-2, the adjustment mode has been activated successfully.
❸ Move the “MENU Dial” to highlight LCD/CVF ADJ and push the “ENTER”.
❹ When changing the adjustment item, please press the “EASY”/”DISPLAY” buttons on the camera.
❺ You can change the adjustment value to move the “MENU Dial” Up or Down.
❻ After setting adjustment value, please push the “ENTER” to confirm Data.

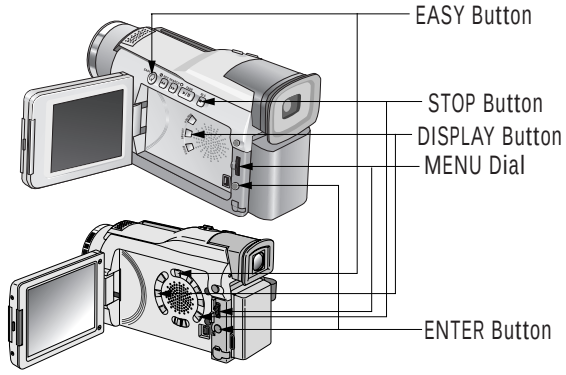


Fig. 3-1

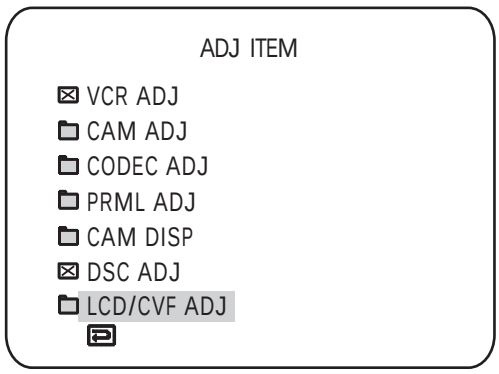


Fig. 3-2

3-2 Function of each buttons on the SET Key

<Table 3-1>

Buttons	Description
ENTER push (Confirm)	Stores changed value in the adjustment and auto adjustment mode.
EASY (Mode Up)	Shift adjustment address to left.
DISPLAY (Mode Down)	Shift adjustment address to right.
MENU Dial up (Data Up)	Up value.
MENU Dial down (Data Down)	Down value.

Note : In service adjustment mode, button names are different from those in customer function control mode.

3-3 Adjust Mode

<Table 3-2>

Mode	NTSC		PAL	
	TRANSMISSION	TRANS-Reflective	TRANSMISSION	TRANS-Reflective
00	55	55	55	55
01	80	80	80	80
02	A0	A0	A0	A0
03	4F	4F	4F	4F
04	80	80	80	80
05	C6	C6	C6	C6
06	B5	B5	B5	B5
07	80	80	80	80
08	80	80	80	80
09	70	70	70	70
0A	95	95	95	95
0B	80	80	80	80
0C	76	76	76	76
0D	60	60	60	60
0E	D0	D0	D0	D0
0F	15	15	15	15
10	52	52	52	52
11	CD	CD	CD	CD
12	C0	C0	80	80
13	80	80	93	93
14	00	00	00	00
15	00	00	00	00

4. Deck Adjustment

4-1 Operation Without Housing Assembly

1) Remove the Housing Ass'y from the recorder unit.
2) Connect the mechanical chassis to the recorder circuit to supply voltage.
3) Set to Unload mode.
4) Press the S/W Push(Keep ON status)to start loading, and push the PLAY Key.
(Cover the Top/End sensor with black tape, because they do not operate.)

Note : For the removal of the Housing Ass'y.

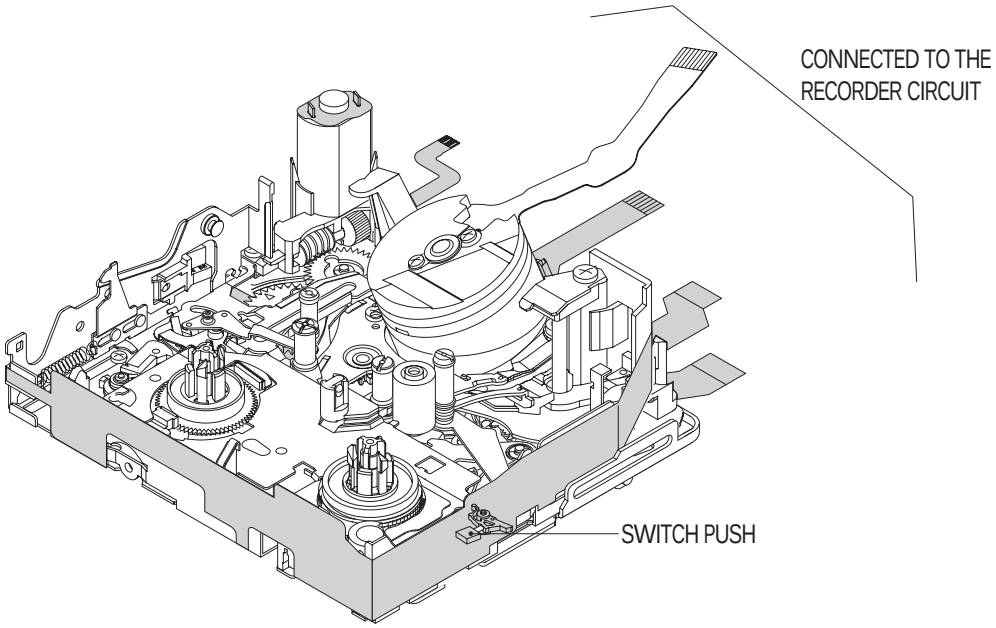


Fig. 4-1

4-2 Setting Mechanical Mode (Without Recorder Circuit)

1) Set the power-supply output to approx.3V.
2) Choose the polarity (depending on whether loading or unloading).
3) Supply the voltage to the Motor Loading, and set to the desired mode.

<Table 4-1>

A	B	Movement of chassis
+	-	Loading
-	+	Unloading

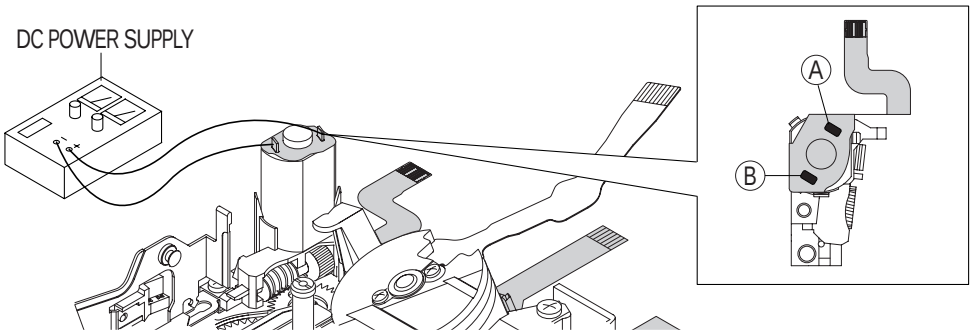


Fig. 4-2

4-3 Maintenance

Carry out the following periodic maintenance checks in order to fully exercise all functions, operations and tape. After repairing, service the set as follows:

1) Cleaning of Drum Assembly

❶ Gently apply lens tissue soaked in ethyl alcohol to the Drum assembly.
Clean the Upper Drum assembly while rotating it slowly counterclockwise(by hand).

Note : Do not rotate the motor by power or rotate the Upper Drum assembly clockwise.
Also, the Head tip will be damaged if the lens tissue is moved in a perpendicular direction.
Be sure to follow these instructions when cleaning the Drum Ass'y

2) Cleaning of Tape Path

❶ In EJECT mode, clean the tape path system(from Pole Tension P1 through Pole Review P7, Pinch Roller and Capstan Shaft) and the Lower Drum. Using the lens tissue soaked in ethyl alcohol.

Note : Make sure that no oil or grease adheres to the lens tissue.

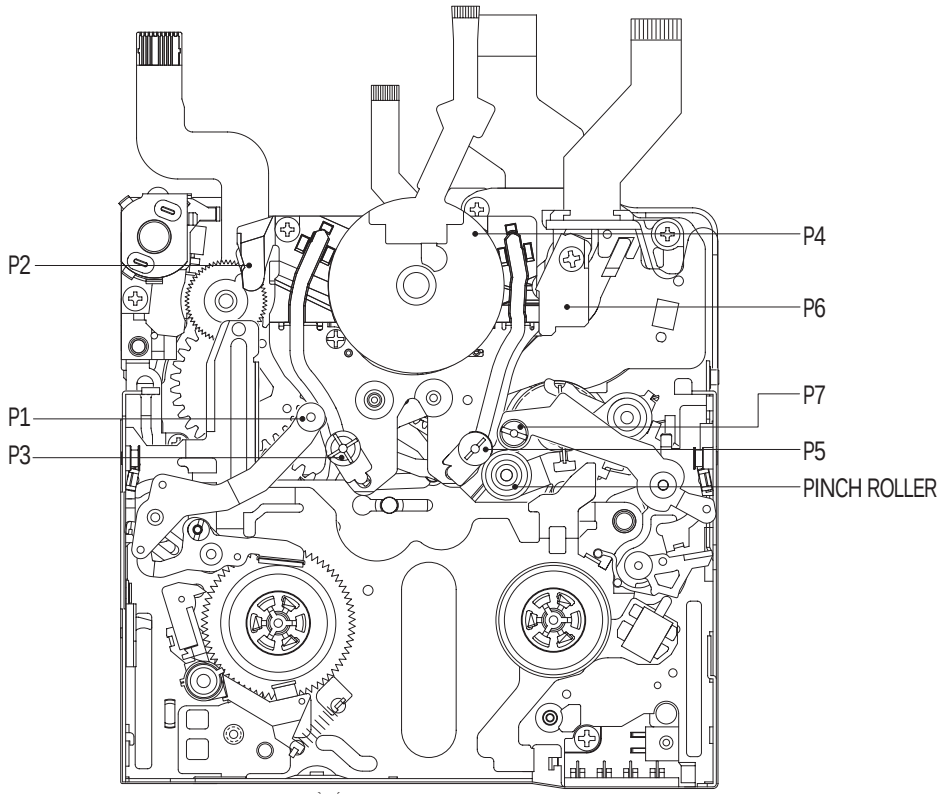


Fig. 4-3

3) Periodic Maintenance and Check List

When overhauling, refer to the following table.

<Table 4-2>

Maintenance checks		Hours of use (H)										Remark
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Tape path system	Cleaning of tape path	O	O	O	O	O	O	O	O	O	O	
	Cleaning and degaussing of drum ass'y	O	O	O	O	O	O	O	O	O	O	
DRIVING SYSTEM	Capstan Shaft		Δ		Δ		Δ		Δ		Δ	- Never let oil get on to the tape path surface.
	Gear Capstan		Δ		Δ		Δ		Δ		Δ	
	Gear Pully Shaft		Δ		Δ		Δ		Δ		Δ	
	Belt Timing		◆		◆		◆		◆		◆	
	Motor Loading		◆		◆		◆		◆		◆	
Perform-ance	Abnormal Noise		◆	◆	◆	◆	◆	◆	◆	◆	◆	
Confir-mation	Back Tension		◆		◆		◆		◆		◆	
	Brake System		◆		◆		◆		◆		◆	
	PB, REV Torque Measurement		◆		◆		◆		◆		◆	

O : Cleaning Δ : COil ◆ : Confirmation

- ◆ When lubrication bearings, be sure to keep the oil free of dust. (Oil contaminated with dust might cause the bearings to wear out or seize.)
- ◆ A "drop"of oil is defined as the amount attached to the tip of a Ø 2mm stick as shown in Fig. 4-4.

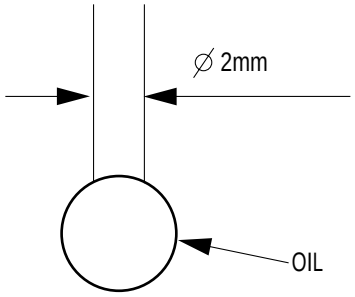


Fig. 4-4

4-4 Mechanical Check and Adjustment

4-4(a) Tension Regulator Adjustment

1) Disassembly

❶ For the removal of the Housing Ass'y.

2) Adjustment

❶ Set to PLAY mode (without cassette tape).
❷ Check that the distance between external surface of Holder Loading and center of Arm Tension is 0~1mm. (Fig. 4-5)
❸ If necessary, proceed to step 4.
❹ If the Arm Tension is located inside the position specified, adjust the Band Adjust Tension toward arrow A. (If it is located outside, adjust toward arrow B.)

Note : Check if the Arm Tension can be moved toward arrow C in PB mode.

3) Reassembly

❶ For the removal of the Housing Ass'y.

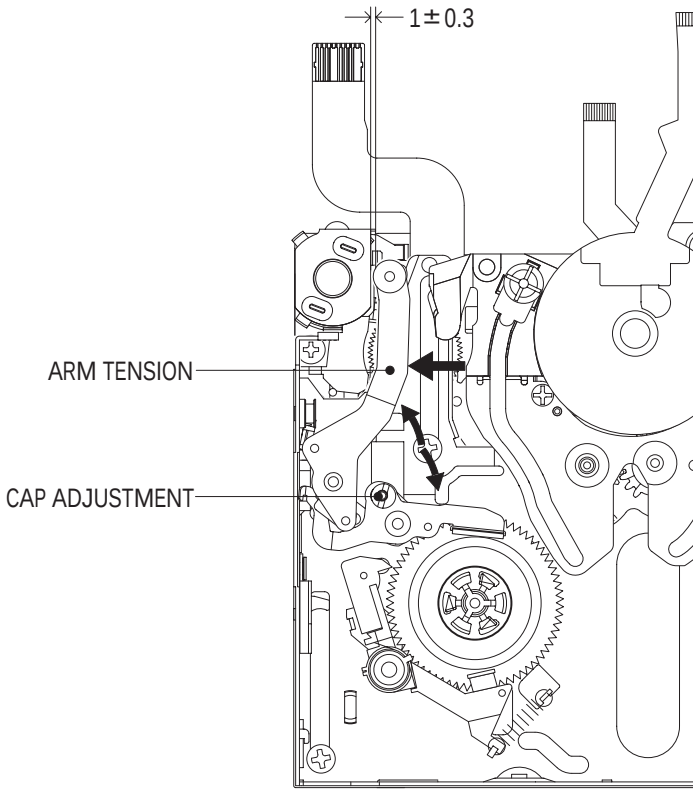


Fig. 4-5

4-4(b) Back Tension Confirmation

1) Set up the cassette-torque tape.
2) Set to CAMERA mode, push the EDIT(+) KEY and check that the torque value of Reel S is 4.5±0.5g.cm.

4-4(c) PB/REV Torque check

1) Set up the cassette torque tape.
2) Set to CAMERA mode, Push the EDIT(+)Key and check that the torque value of Reel T is 7.5±3g.cm.
3) Push the EDIT(-) Key and check that the torque value of Reel S is 12.5±3g.cm.
4) If necessary, replace the defective Gear pully Ass'y.

4-4(d) Reel Table Height Check

1) Removal

❶ For the removal of the Housing Ass'y.
❷ For the removal of the Idler Ass'y.

2) Check

❶ Using vernier calipers, check the following distances : From the upper surface of the PCB Reel to the resting surfaces of Reel S, T table should each be 3.9±0.1mm.

3) Mounting

❶ For the removal of the Idler Ass'y.
❷ For the removal of the Housing Ass'y.

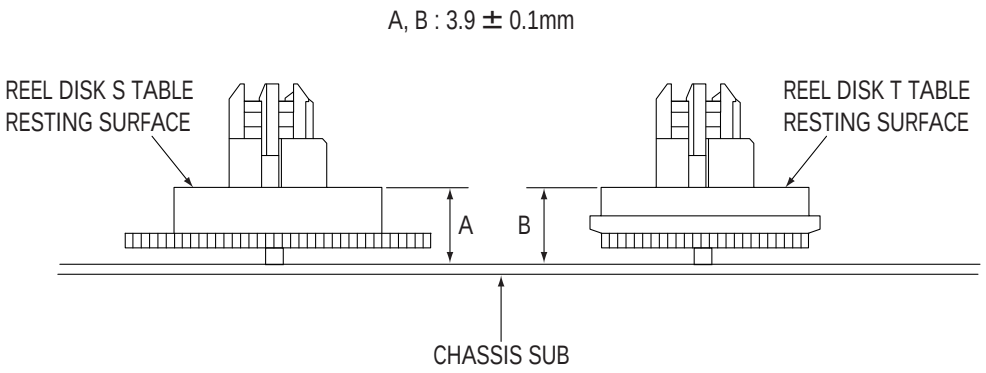


Fig. 4-6

4-5 Tape Path Adjustment

4-5(a) Preparation for Adjustment

❶ Clean the tape running surface(Poles, Drum, Capstan Shaft, Pinch Roller).
❷ Observe the PB RF signal and Head Switching Pulse on an oscilloscope.
❸ Play back the alignment tape.
❹ Check that the waveform of the RF signal is flatat both inlet and outlet(A in Fig. 4-7).
If not flat (B or C in Fig. 4-7), do adjustments 4-5(b) through 4-5(d).

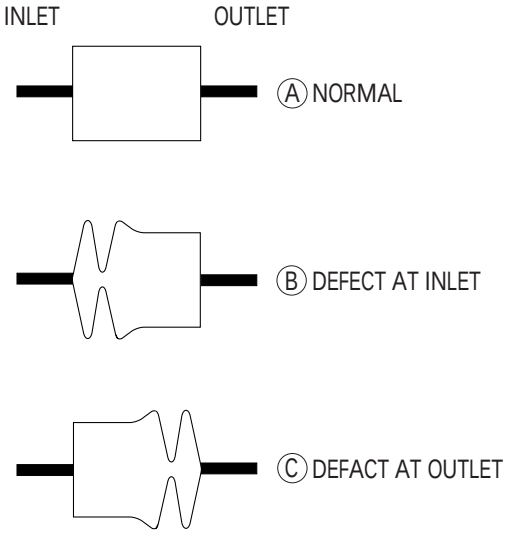


Fig. 4-7

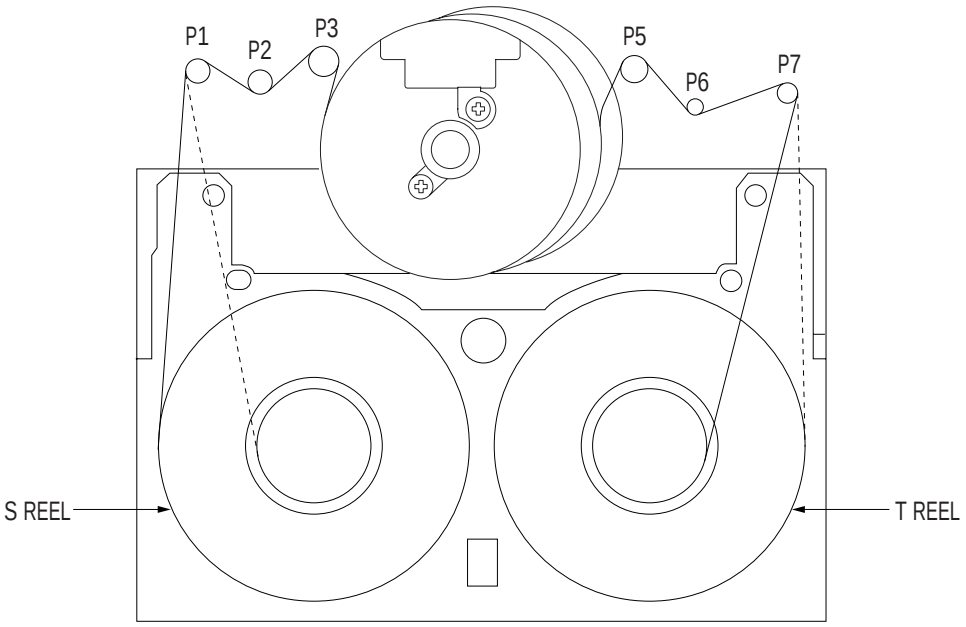


Fig. 4-8

4-5(b) Tracking adjustment

❶ Play Back the alignment tape.
❷ Turn P3 to flatten the waveform at the inlet.
❸ Turn P5 to flatten the waveform at the outlet.

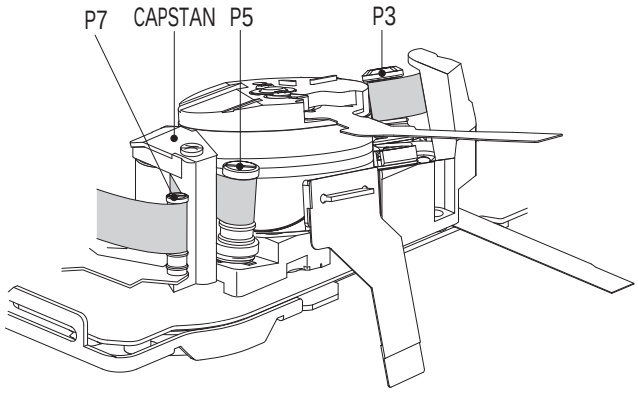


Fig. 4-9

4-5(c) P7 Adjustment

❶ Play back the alignment tape, and confirm that the tape is not twisted between the Guide Roller T and Capstan. (If the tape is twisted, turn P7, Fig. 4-10)
❷ Set to REV mode and observe the outlet waveform of PB RF signal. (Fig. 4-11)
❸ If the outlet waveform is out-of-spec, turn P7 counterclockwise, and redo steps 1 and 2.

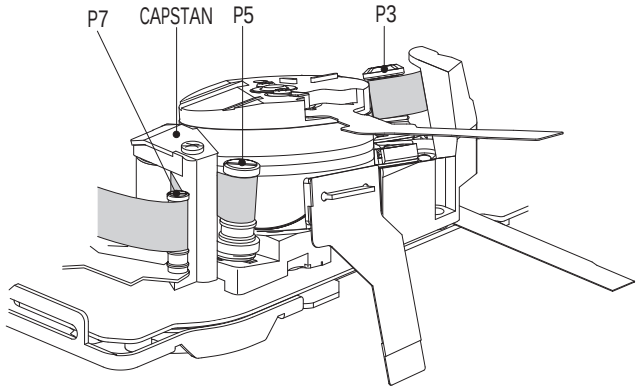


Fig. 4-10

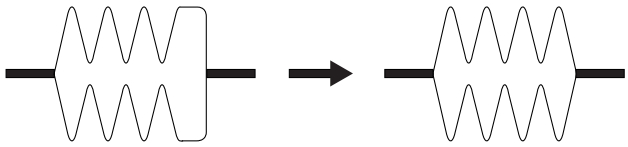


Fig. 4-11

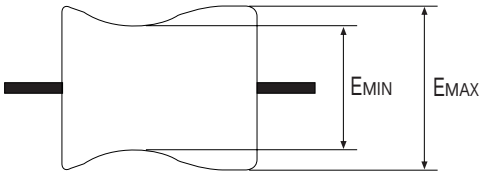
4-5(d) Check After Adjustment

1) Tracking Check

❶ Play back the alignment tape.

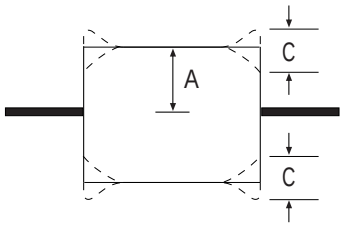
❷ Confirm that the minimum amplitude value(E min.)is 80% of the maximum value(E max.) or larger. (Fig. 4-12)

❸ Confirm that no large fluctuation occur on the waveform. (Fig. 4-13)



$$\frac{E_{MIN}}{E_{MAX}} \geqq 80(\%)$$

Fig. 4-12



$$C \leqq \frac{1}{8} A$$

Fig. 4-13

2) CUE and REV Check

❶ Play back the alignment tape, and set to REV mode.
Confirm that the waveform peaks have a uniform Pitch.(Fig. 4-14 A)
If the track pitch is not uniform, do section 4-5(b) (Tracking adjustment) and 4-5(c) (P7 adjustment).

❷ Set to CUE mode.
Confirm that the waveform peaks still have a uniform pitch. (Fig. 4-14 B)
If the track pitch is not uniform, do section 4-5(b) (Tracking Adjustment).

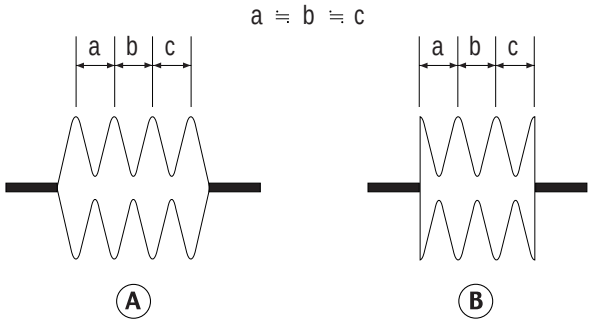


Fig. 4-14

3) Rise Time Check

❶ Play back the alignment tape.

❷ Set to playback mode, and confirm that the waveform of PB RF signal rises flat within 3 seconds. Also confirm that the tape is not twisted or curled around the Pinch Roller. (Fig. 4-15)

❸ Run the tape in CUE/REV and FF/REW modes, then playback. Confirm the waveform of PB RF signal rises flat within 3 seconds. Also confirm that the tape is not twisted or curled around the Pinch Roller.

❹ Repeat steps 2. and 3.

4) Tape Path Check

❶ In CUE and REV modes, check that the tape is not curled around the P1, P3, P5 upper flange and P7 upper/Lower flanges.

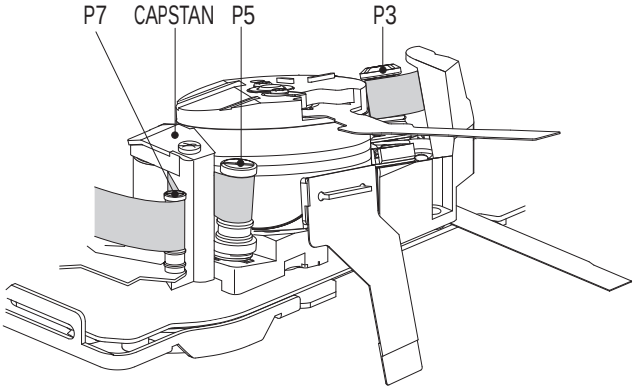


Fig. 4-15

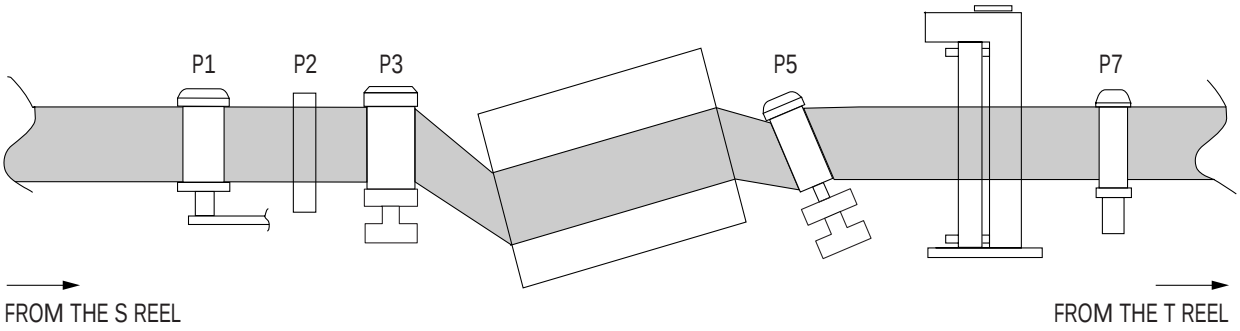


Fig. 4-16

MEMO